What is claimed is:

1. A process for making a hard pellicle for a photomask, comprising the following steps:

(i) providing a substrate having a substantially flat surface;

(ii) depositing an intermediate layer comprising an amorphous silicon layer on top of the substantially flat surface of the substrate;

(iii) depositing a pellicle layer having a first surface and a second surface on the surface of the intermediate layer, with the first surface bonding to the surface of the intermediate layer, and the second surface opposite to the first surface;

(iv) bonding a pellicle mount frame to the second surface of the pellicle layer; and

(v) separating the pellicle layer and a portion of the intermediate layer from the substrate at a location within the intermediate layer by heat treatment.

2. A process in accordance with claim 1, wherein the intermediate layer is a single layer consisting essentially of hydrogenated amorphous silicon.

3. A process in accordance with claim 1, wherein the intermediate layer is a multiple-layer system comprising a first layer of hydrogenated amorphous silicon and a second layer which is fluorinated, wherein the first layer and the second layer have direct contact with each other.

4. A process in accordance with claim 3, wherein the second layer is fluorine doped silica or fluorine doped SiN layer.

5. A process in accordance with claim 3, wherein the first layer is deposited first, and the second layer is deposited on top of the first layer thereafter.

6. A process in accordance with claim 3, wherein the second layer is deposited first, and the first layer is deposited on top of the second layer thereafter.

7. A process in accordance with claim 1, wherein the substrate in step (i) is flat sheet glass, a fused silica wafer, a silicon wafer, or a silicon wafer having a thermal oxidization layer.

8. A process in accordance with claim 1, wherein in step (iii), the pellicle layer consists essentially of a material selected from silica, fluorine doped silica, aluminum

doped silica, methylated silica, fluorinated and methylated silica, fluorinated aluminum doped silica, CaF_2, MgF_2, BaF_2 and SiC.

9. A process in accordance with claim 1, wherein in steps (ii) and (iii), the intermediate layer and the pellicle layer are independently deposited via chemical vapor deposition and/or plasma vapor deposition, or sol-gel process.

10. A process in accordance with claim 9, wherein in steps (ii) (iii), the intermediate layer and the pellicle layer are independently deposited via a process selected from plasmas enhanced chemical vapor deposition (PECVD), low pressure chemical vapor deposition (LPCVD), sub-atmospheric chemical vapor deposition (SACVD), ion-assisted e-beam evaporation, non ion-assisted e-beam evaporation and sputtering.

11. A process in accordance with claim 9, wherein in steps (ii) and (iii), the intermediate layer and pellicle layer are deposited via plasma enhanced chemical vapor deposition (PECVD).

12. A process in accordance with claim 1, wherein in step (iv), the bonding between the pellicle layer and the pellicle mount frame is effected by wafer bonding.

13. A process in accordance with claim 12, wherein the bonding is effected by anodic bonding, low-temperature bonding or fusion bonding.

14. A process in accordance with claim 1, wherein in step (iv), the bonding between the pellicle layer and the pellicle mount frame is effected by using frit.

15. A process in accordance with claim 1, wherein in step (iv), the pellicle mount frame consists essentially of a material having substantially the same coefficient of thermal expansion as that of the pellicle layer.

16. A process in accordance with claim 1, wherein in step (iv), the pellicle mount frame consists essentially of silica.

17. A process in accordance with claim 15, wherein the pellicle mount frame is porous and allows for the passage of purging gas used during the lithographic process.

18. A process in accordance with claim 1, wherein the heat treatment used in step (v) for separating the pellicle layer and a portion of the intermediate layer is effected by laser heating.

19. A process in accordance with claim 1, further comprising either a further step (vi) as follows:

(vi) removing the residual material from the intermediate layer on top of the first surface of the pellicle layer;

or a step (vii) as follows:

(vii) converting the residual material from the intermediate layer on top of the first surface of the pellicle layer to a material compatible with the pellicle layer.

20. A process in accordance with claim 19, wherein step (vi) is carried out, in which plasma etching is used to remove the residual material from the intermediate layer.

21. A process in accordance with claim 19, wherein step (vii) is carried out, in which thermal oxidation is used to convert the residual material from the intermediate layer to a material compatible with the pellicle layer.

22. A process in accordance with claim 1, further comprising the following step (viii) after step (v):

(viii) forming an antireflective coating on at least the pellicle surface opposite to the pellicle mount frame.

23. A process in accordance with claim 19, further comprising the following step (viii) after step (vi) or (vii):

(viii) forming an antireflective coating on at least the pellicle surface opposite to the pellicle mount frame.